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[Amendments: There are no amendments attached to this patent. Translator's note]

[Note: All names, addresses, company names, and brand names are translated in the most common manner. Japanese language does not have singular or plural words unless otherwise specified with numeral prefix or general form of plurality suffix. Translator's note]

(54) [TITLE OF THE INVENTION]

THREE-DIMENSIONAL IMPACT DETECTION AND DISPLAY MEMBER

[Sanjigen shogeki kenchi hyoji buzai]

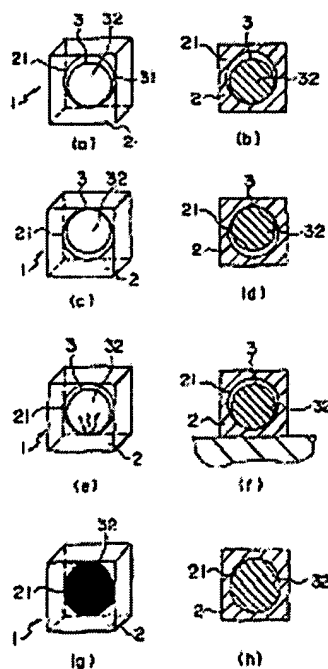
(57) [ABSTRACT]

[SUBJECT]

It offers three-dimensional impact detection and display member that does not require a detection circuit or a power supply, and is capable of detecting and displaying an impact such as drop [fall] and the like with ease of judgment.

[MEANS OF SOLUTION]

According to a three-dimensional impact detection and display member (1) that is capable of detecting and displaying an impact such as drop and the like that may occur in any optional directions, it is equipped with a sealing body (3) that encapsulates a coloring material (32) through an outer shell (31), a casing body (2) that surrounds sealing body (3) while providing a free space. The outer plane of the sealing body (3) and inner plane of the casing body (2) are both formed as a spherical shape.



[CLAIMS]

[CLAIM ITEM 1]

According to a three-dimensional impact detection and display member that is capable of detecting and displaying an impact such as drop and the like that may occur in any optional directions, the three-dimensional impact detection and display device is characterized by the fact that is equipped with a sealing body that encapsulates a coloring material with an outer shell, and a casing body that surrounds sealing body while providing a free space.

[CLAIM ITEM 2]

The three-dimensional impact detection and display member according to the description of claim item 1, wherein outer plane of the sealing body explained above and inner plane of casing body are both made as spherical shape.

[CLAIM ITEM 3]

The three-dimensional impact detection and display member according to the description of claim item 1 or 2, wherein above-explained outer shell is made as either non-transparent or semi-transparent.

[CLAIM ITEM 4]

The three-dimensional impact detection and display member according the description of claim items 1 through 3, wherein operates by being attached to an electronic apparatus to detect an impact that is subjected to by said electronic apparatus.

[DETAILED EXPLANATION OF THE INVENTION]

[0001]

[TECHNICAL FIELDS OF THIS INVENTION]

This invention relates to a three-dimensional impact detection and display member. It relates to the three-dimensional impact detection and display member that is capable of detecting and displaying whether or not an electronic apparatus such as, for instance, portable telephone and the like, has been subjected to an impact such as drop and the like.

[0002]

[PRIOR ART]

Popularity toward small-size electronic apparatus, in particular, toward portable type has been remarkable in recent years. In the case of portable type, increase in number of failures caused by impacts such as drop and the like can be considered. On the one hand, regarding failure modes, they can be mainly categorized as inherent that is caused by defects on electronic apparatus or electronic parts, and as the one that is acquired due to impacts by drop of apparatus. It is necessary to distinguish these failure modes from the standpoint of product guarantee and the like.

[0003]

And therefore, small-size detection and display member that is of reasonable cost and detects and displays impacts such as drop and the like reaching the level of failure has been sought on the electronic apparatus, in particular, mobile telecommunication devices such as portable telephone or PHS and the like.

[0004]

Accelerometer that measures level of acceleration has been used in general in order to detect impacts such as drop and the like. As this accelerometer, a sensor that perceps degree of acceleration leading to the limit of breakdown and outputs as electrical signals through attached circuit has been known. (For instance, make reference to the Japanese patent application of Kokai Hei 5 [1993]-142243 publication.) This sensor is manufactured with intent to measure characteristics electrically, and requires external circuit and power supply and the like for such measurement.

[0005]

[SUBJECTS SOLVED BY THIS INVENTION]

This invention's purpose is to offer a three-dimensional impact detection and display member with a reduced size, in particular to enable a reduction of space that is used to attach to apparatus, and in addition, it does not require detection circuit or power supply and detects impacts such as drop and the like to display in a manner easy to make judgment.

[0006]

[MEANS TO SOLVE THE SUBJECTS]

According to the three-dimensional impact detection and display member that is capable of detecting and display impacts such as drop and the like that may occur in any optional directions, this invention's three-dimensional impact detection and display member is equipped with a sealing body that encapsulates a coloring material through an outer shell, and a casing body that surrounds said sealing body while providing a free space.

[0007]

In addition, this invention's three-dimensional impact detection and display member of which outer plane of sealing body and inner plane of casing body explained are both of spherical shape.

[0008]

Furthermore, this invention's three-dimensional impact detection and display member of which outer shell explained above is made as either non-transparent or semi-transparent.

[0009]

In addition, this invention's three-dimensional impact detection and display member explained above operates by being attached to electronic apparatus and by detecting impacts subjected by the electronic apparatus.

[0010]

[IMPLEMENTATION FORMAT OF THIS INVENTION]

Implementation format of the invention of that of this invention is explained below. Explanation on the example of this invention's three-dimensional impact detection and display device is provided based on Figure 1 ~ Figure 2. Figure 1 illustrates an explanatory view of three-dimensional impact detection and display member of the example 1. Figure 2 illustrates an explanatory view of portable-type electronic apparatus to which three-dimensional impact detection display member of the example 2 is attached.

[0011]

Example 1 is explained below. According to the three-dimensional impact detection and display member (1) of this example, as illustrated in the Figure 1, it is composed of a casing (2) that works as a casing body and an ink bowl (3) that works as a sealing body. The casing (2) is composed of either a transparent or a semi-transparent glass material or resin and the like of which inner plane is subjects to a frosting process; and it shows a structure of enclosing said ink bowl (3) while sealing this tight. The ink bowl (3) is composed of an outer shell (31) that is made of a non-transparent glass material or resin and the like, and red display ink (32) that works as sealed in coloring material. Furthermore, as one example of size of three-dimensional impact detection and display member (1), it is preferable when minimum value of the size of ink bowl that allows visual detection of coloring material that is adhered to the inner plane of the casing is about 1 mm in diameter, and maximum value for purpose of installing on a portable telephone including said casing is about 5 mm in diameter, and size of the casing that encloses above-explained ink bowl is of a cube showing 3 ~ 7 mm on one side.

[0012]

Principles of inspection [note: although the original document states the term inspection, may be a misprint of detection, translator's note] of the three-dimensional impact detection and display member of the example 1 is explained with Figure 1. Furthermore, (b), (d), (f) and (h) each illustrate cross-sectional explanatory view respectively. The ink bowl (3) is in a state that is dropped to the bottom by gravity within a hollow casing (2). The outer shell (31) that forms container of display ink (32) (seals in coloring material such as ink and the like or color red and the like) of the ink bowl (3) is made of non-transparent (color white and the like) glass material or resin material; and display ink (32) that is inside cannot be seen. On the one hand, as illustrated in the Figure 1 (c) and (d), at the time of drop, the ink bowl (3) drops with inertia while sticking to the inner plane of the casing (21) that is a reversal plane to the drop direction. In addition, as illustrated in the Figure 1 (e) and (f), at the time of collision, outer shell (31) of the ink bowl (3) breaks with the impact of collision (G); and as illustrated in the Figure 1 (g) and (h), sealed in display ink (32) flows out to the hollow casing (2) to color this to allow simple visual detection. Furthermore, the frost treated plane of inner plane of the casing that is of a frosted glass form allows viewing of display ink (32) in a slight manner prior to the coloration; and after such coloration, display ink (32) becomes well visible.

[0013]

Regarding three-dimensional impact detection and display member (1) of the example 1, because outer plane of the ink bowl (3) and inner plane of the casing (21) are both structured in a spherical shape, regardless of its posture of attachment, the ink bowl (3) is surely to be subjected to the impact (G) in the drop direction. When it is explained conversely, it would mean a sure detection of working impact (G) no matter which posture the product to which this member is attached (1) may be dropped to allow a detection and display of three-dimensional impact.

[0014]

Regarding setting of impact (G) that is to be detected, it can be set easily in a wide sense through breakdown strength of the outer shell (31) of the ink bowl (3). During such time, casing (2) may not need to be changed, and through varying the strength of the outer shell (31) of the ink bowl from the standpoint of material, thickness, shape, or outer shape and the like, it is possible to easily set the set value of optional impact (G). Furthermore, combination of the casing (2) and ink bowl (3) may be as such that the casing (2) made of glass material or resin material and the like of which inner plane is made semi-transparent through a frosting process, and outer shell (31) that is made of transparent glass material or resin material and the like.

[0015]

Example 2 is explained below. The electronic apparatus of this example is a portable telephone; and as illustrated in the Figure 2, it is composed of a portable telephone main body (4) and three-dimensional impact detection and display member (1). The three-dimensional impact detection and display member (1) is buried, for instance, at the bottom part of portable telephone main body (4). When portable telephone is dropped, the three-dimensional impact detection and display member (1) operates in the manner as explained in the column [0012] to detect this impact to display.

[0016]

#### [EFFECTS OF THIS INVENTION]

According to this invention, it does not require a detection circuit or a power supply, and furthermore, it can detect impacts such as drop and the like without soiling the surrounding to allow a display that is easy to judge. In addition, its size is made small to provide a three-dimensional impact detection and display member that allows reduction of the enclosure space within a small-size electronic apparatus.

#### [BRIEF EXPLANATION OF THE FIGURES]

##### [FIGURE 1]

It illustrates an explanatory view of three-dimensional impact detection and display member of the example 1.

##### [FIGURE 2]

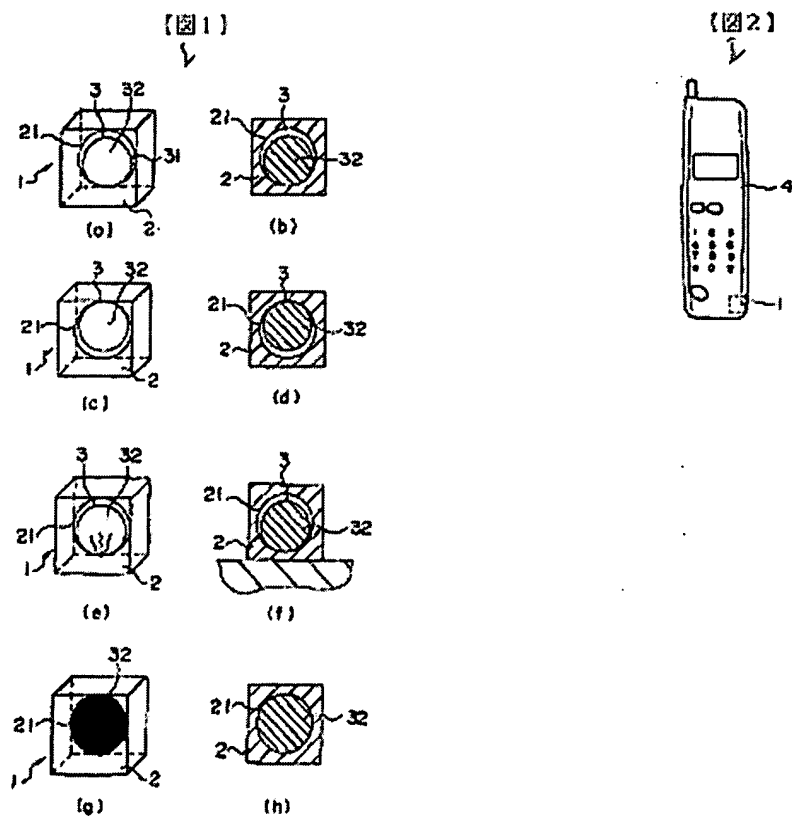
It illustrates an explanatory view of portable electronic apparatus to which three-dimensional impact detection and display member of the example 2 is attached.

[DESCRIPTON OF CODES]

1: three-dimensional impact detection and display member, 2: casing, 21: inner plane of the casing, 3: ink bowl, 31: outer shell, 32: coloring material, 4: portable telephone main body

Figures 1 and 2

I: Figure



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